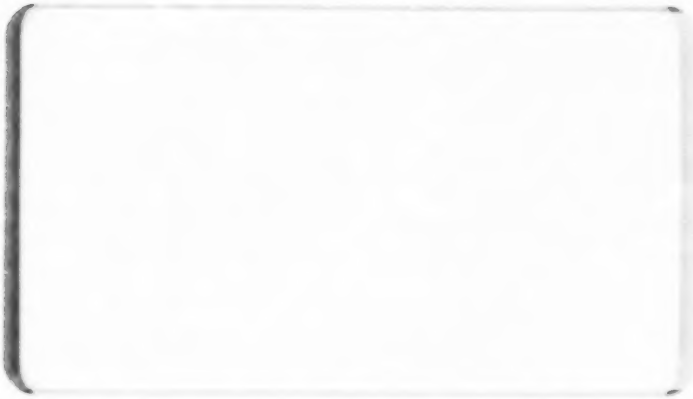
Water Resources



Alberta
ENVIRONMENT

FLOOD OF JULY 1986
IN THE
PADDLE RIVER BASIN

Alberta Environment
Water Resources Management Services
Technical Services Division
Hydrology Branch

FLOOD OF JULY 1986
IN THE
PADDLE RIVER BASIN

NOVEMBER 1986

1. Precipitation

The July 1986 rainstorm produced extreme runoff conditions throughout west-central Alberta. Although the headwaters of the Paddle River basin were not situated in the major storm centre, significant rainfall was still recorded. The precipitation for the July 1986 storm is summarized in Table 1. The majority of precipitation fell within a 24-hour period on July 17. Maximum 24-hour totals ranged from 36.6 mm to 72.2 mm (1.44 to 2.84 inches). This concentration of the precipitation, coupled with the wet conditions in the area throughout July, produced flood flows in the headwaters of the Paddle River, particularly upstream of the Paddle River Dam.

Table 1: July 16 to 18, 1986 Precipitation

Gauge Name	Sub-Basin Location	Maximum 24-Hour		Total	
		mm	inches	mm	inches
Greencourt	Little Paddle	43.4	1.71	58.2	2.29
Little Paddle Headwaters	Little Paddle	72.2	2.84	81.5	3.21
Mayerthorpe	Upper Paddle	46.2	1.82	68.6	2.70
Paddle Dam	Upper Paddle	45.7	1.80	65.2	2.57
Paddle Headwaters	Upper Paddle	62.3	2.45	75.9	2.99
Twin Lakes	Twin	36.6	1.44	56.4	2.22

2. Paddle River Near Anselmo

Flows at the Paddle River near Anselmo streamflow station flooded the recorder that was established in 1980. The flood peak at this station is estimated to have been 49.0 cubic metres per second (cms) (1,730 cubic feet per second (cfs)). The inflow peak to the Paddle River Dam is often approximated by doubling the value at the Anselmo station. Thus, a simple estimate of the Paddle Dam inflow would be 98.0 cms (3,460 cfs).

3. Paddle River Dam

The outflow of the Paddle River Dam is recorded at the Paddle River near Rochfort Bridge station. By backrouting these outflows and accounting for known storage changes in the reservoir, the inflow to the Paddle River Dam is determined. The calculated inflow peaked at 102 cms (3,600 cfs), which agrees well with the estimate using the Paddle River near Anselmo station. This represents the second largest flood peak recorded at this site since 1963, exceeded only by the 1965 event. A flood peak of this magnitude has a 6.7% chance of occurring in any one year, and over the long term would be expected to occur once every fifteen years.

During the July 1986 flood, the Paddle River Dam was not fully operational, as the second stage concreting of four of the seventeen closure joints in the conduit had not been completed. Thus at the onset of the flood, the reservoir was well below the permanent pool elevation. In addition, the control gates on the conduit were in a wide open position, and remained so throughout the flood. Still, the dam contributed significantly to reducing the flood peak downstream. Routing of the flood through the reservoir, even with the control gates wide open, reduced the flood peak. A total of 10,913 dam^3 (8,850 acre-feet) of water was stored in the reservoir. The outflow from the Paddle River Dam was held to a maximum of 47.4 cms (1,670 cfs), a 53% reduction in the inflow peak. The hydrographs are illustrated in Figures 2 and 3.

4. Little Paddle River Near Mayerthorpe

The flood on the Little Paddle River was not as severe as the Paddle River upstream of the Dam. The flood peaked at 45.6 cms (1,610 cfs). A flood peak of this magnitude has a 20% chance of occuring in any one year, and over the long term would be expected to occur once every five years.

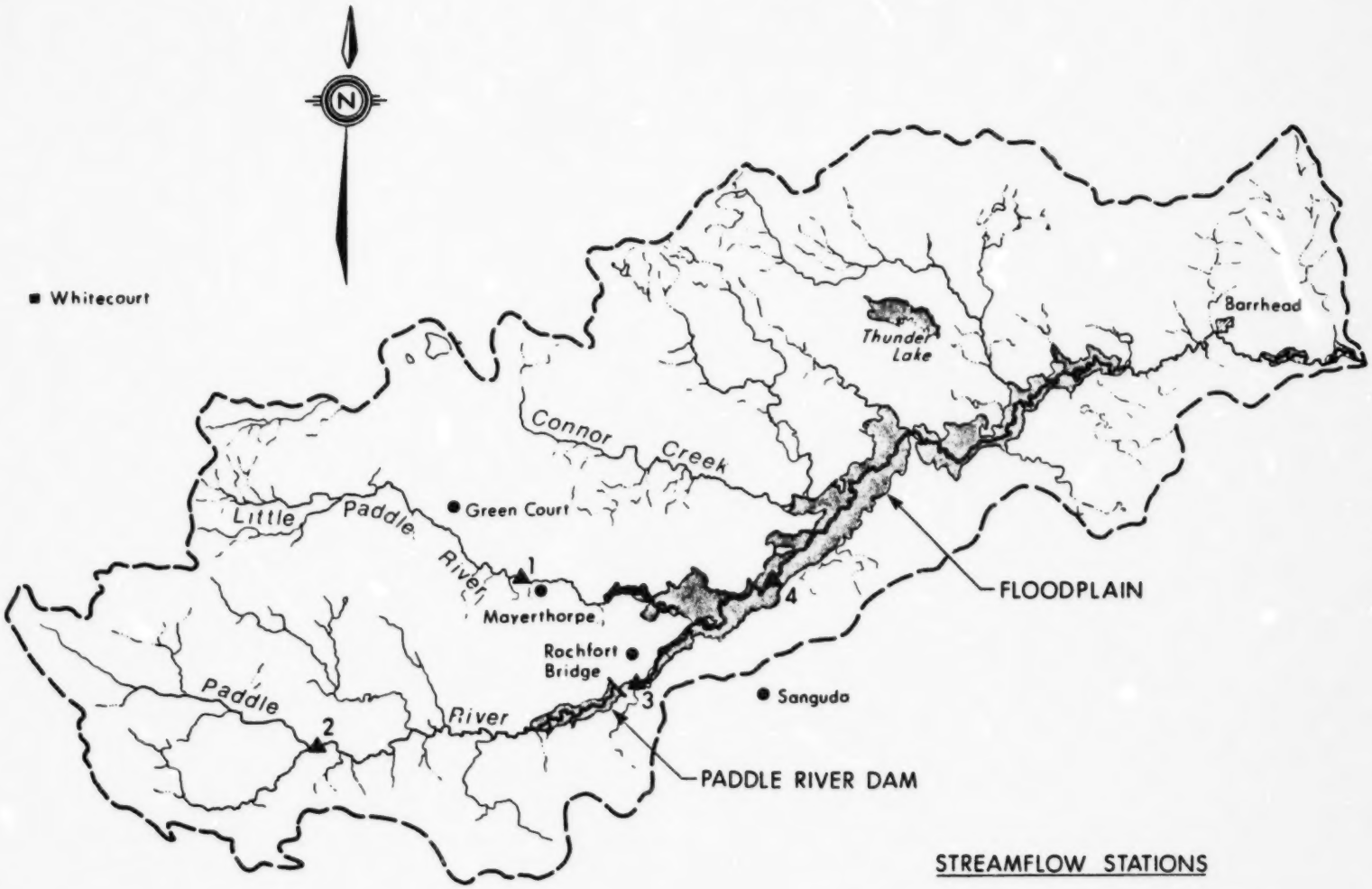
5. Paddle River Near Sangudo

The streamflow station at this site was also damaged during the July 1986 flood. Miscellaneous discharge measurements taken by the Water Survey Section were used in reconstructing the flood hydrograph at this site. The runoff from the local area downstream of the Little Paddle River near Mayerthorpe and the Paddle River Dam to the Paddle River near Sangudo was estimated as a percentage of the Little Paddle River flow. The percentage was adjusted such that the hydrographs from the sub-areas, routed using the River Forecast Centre SSARR model of the basin, combined to reproduce the measured flows at Sangudo. The resulting hydrograph is shown on Figure 2. The estimated flood peak is 74.5 cms (2,630 cfs).

6. Paddle River at the Little Paddle River Confluence

Once the local area contribution to Sangudo was established, the SSARR model was used to provide estimates for the confluence. The peak for the July 1986 flood at the confluence is estimated to have been 80.5 cms (2,840 cfs). Without the Paddle River Dam, the flood peak at the confluence would have been in the order of 137 cms (4,820 cfs). This flow would have substantially exceeded channel capacity along the Paddle River, resulting in widespread flooding. Clearly, the Paddle River Dam prevented the floodplain from being widely inundated.

FILE No. DRAWING MICR DAT



Alberta ENVIRONMENT

TECHNICAL SERVICES DIVISION
HYDROLOGY BRANCH

SUBMITTED R BOTHE, P ENG.
DATE DEC. 10, 1986

APPROVED M. MUSTAPHA, P ENG.
DATE DEC. 10, 1986

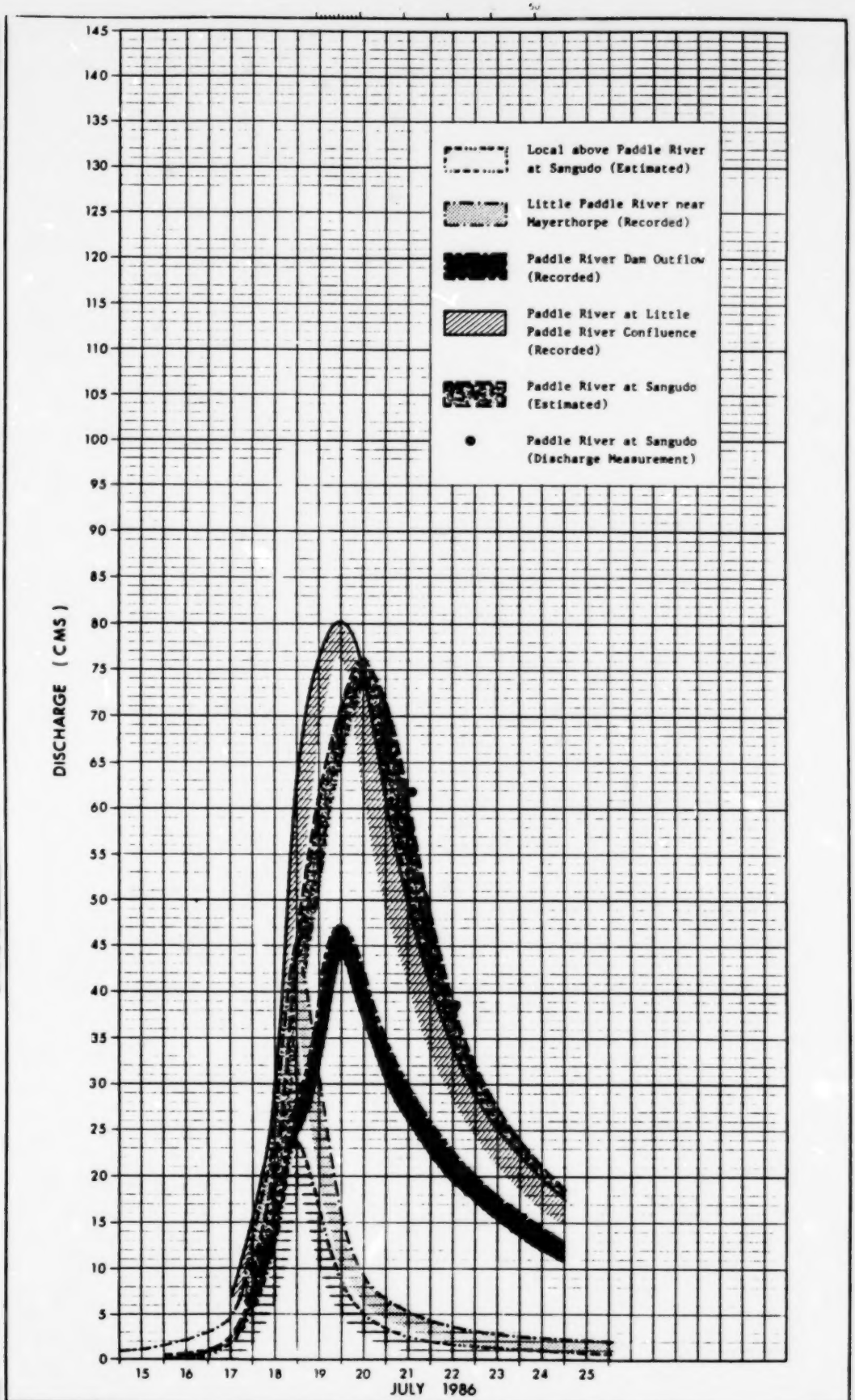
DESIGNED R BOTHE, P ENG
CHECKED

DRAWN V. DA SILVA
CHECKED

SCALE 1" = 7 MILES APPROX.
DATE DEC., 1986

PADDLE RIVER BASIN

FIGURE No. 1



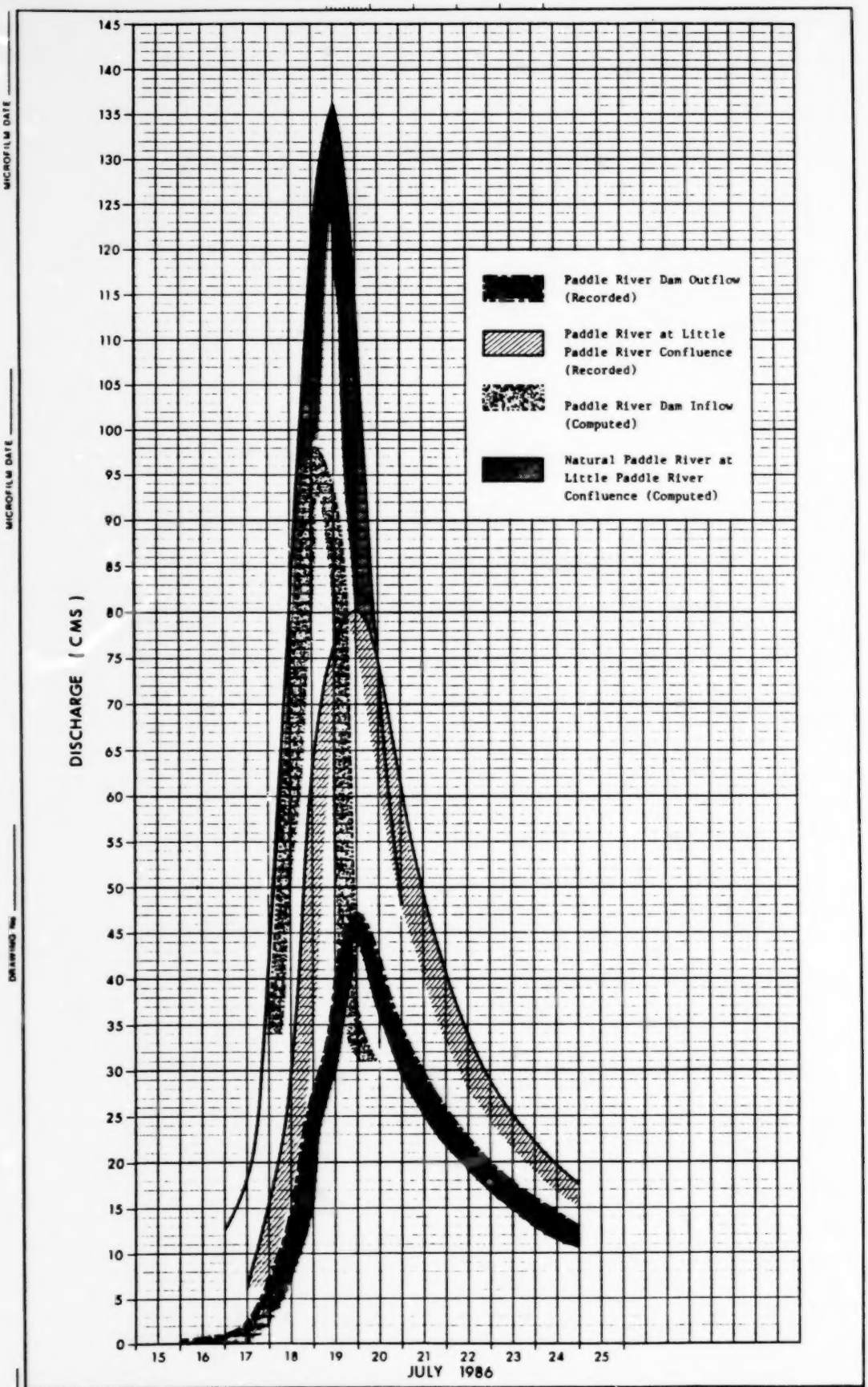
Alberta Environment	TECHNICAL SERVICES DIVISION HYDROLOGY BRANCH	FLOWS RECORDED DURING THE JULY 1986 FLOOD
SUBMITTED R BOTHE, P ENG DATE NOV, 1986	DESIGNED R BOTHE, P ENG CHECKED	
APPROVED M MUSTAPHA, P ENG. DATE NOV, 1986	DRAWN V DA SILVA CHECKED	SCALE AS SHOWN DATE NOV, 1986 — FIGURE No. 2

MICROFILM DATE

MICROFILM DATE

DRAWING No

FILE No



MICROFILM DATE

MICROFILM DATE

DRAWING No

FILE No

Alberta Environment	TECHNICAL SERVICES DIVISION HYDROLOGY BRANCH	IMPACT OF PADDLE RIVER DAM ON THE JULY 1986 FLOOD
SUBMITTED R. BOTHE, P. ENG. DATE NOV., 1986	DESIGNED R. BOTHE, P. ENG. CHECKED	
APPROVED M. MUSTAPHA, P. ENG. DATE NOV. 1986	DRAWN V. DA SILVA CHECKED	SCALE AS SHOWN DATE NOV., 1986 — FIGURE No. 3